Feb. 6, 1934. L. D. NILSON 1,945,910

LIFTING JACK WITH TRAVELING PAWL MECHANISM

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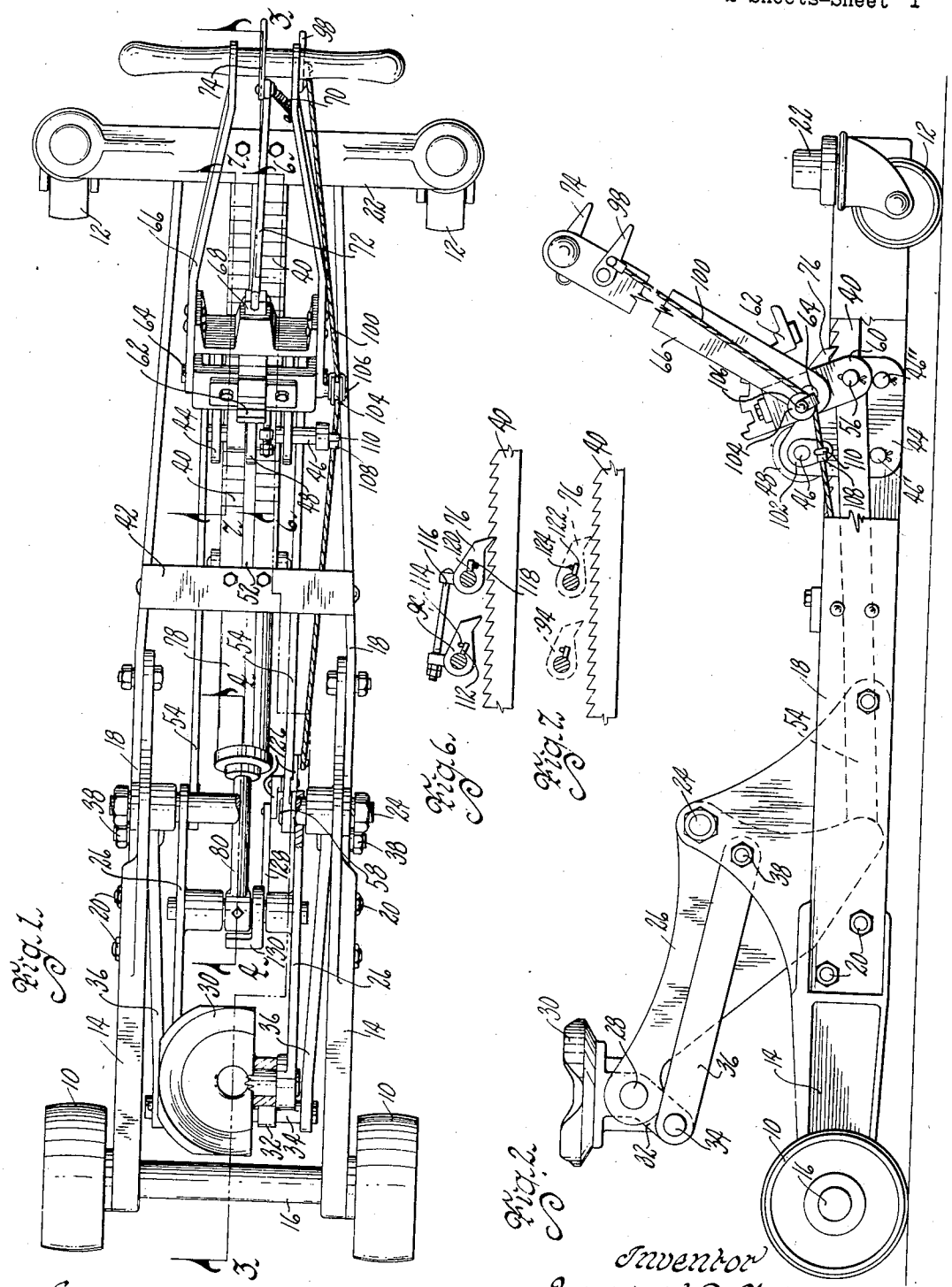


Fig. 1.

Fig. 6.

Fig. 7.

Fig. 2.

Witness
Edw. Seley

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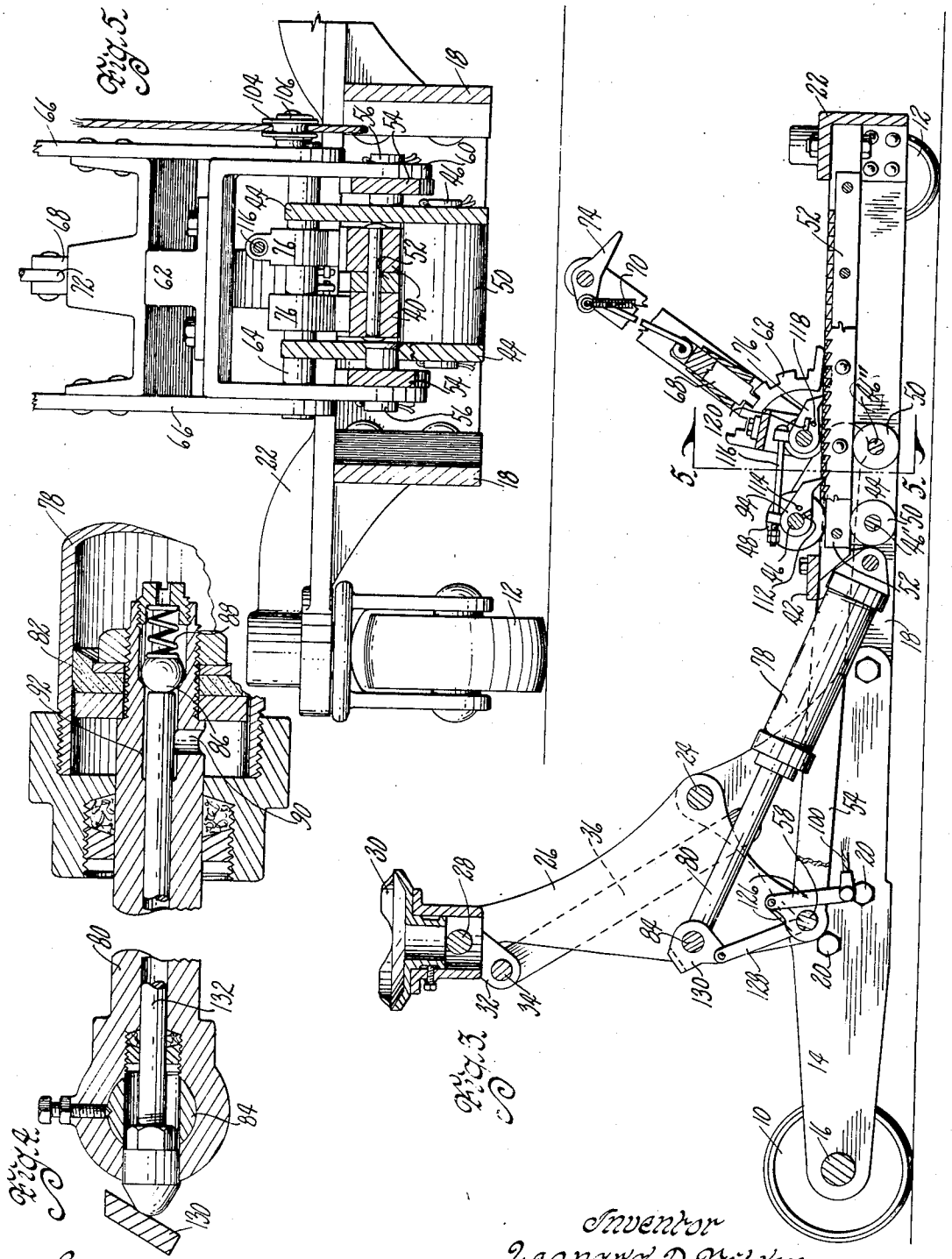


Fig. 5.

Fig. 4.

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LIFTING JACK WITH TRAVELING PAWL MECHANISM

Leonard D. Nilson, Wayzata, Minn.

Application July 25, 1932. Serial No. 624,624

15 Claims. (Cl. 254—2)

An object of my present invention is to provide a simple and durable lifting jack with a pawl mechanism which travels along a ratchet bar for the purpose of imparting lifting movement to a lifting head of the jack.

Still a further object is to provide a lifting jack comprising a frame and a lifting arm pivoted thereto and mechanism for imparting lifting movement to the lifting arm comprising a stationary ratchet bar and a traveler thereon carrying pawls which coact with the ratchet bar to move the traveler relative thereto, the traveler being operatively connected with the lifting arm.

Still a further object is to provide a pair of ratchet bars and a pair of pawl means coacting therewith, the teeth of the ratchet bars being staggered whereby to reduce the required length of stroke of the operating handle so that it can be operated in close quarters.

Still a further object is to provide a hydraulic mechanism for holding any lifting movement gained by the pawl mechanism and including a check valve.

Still a further object is to provide release means for the jack which opens the check valve and thereby permits and controls descent of the lifting head without the necessity of actuating the operating handle for lowering purposes as in the ordinary type of pawl jack.

Another object is to provide a settling pawl to prevent any possibility of the hydraulic mechanism allowing the load to settle when once raised.

Still another object is to provide means for rendering the lifting and settling pawls of the jack inoperative at the same time that the check valve is opened so as to permit lowering of the jack.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of a lifting jack embodying my invention.

Figure 2 is a side elevation of the same, a part of a frame bar thereof being broken away.

Figure 3 is a longitudinal vertical sectional view on the line 3—3 of Figure 1.

Figure 4 is a sectional view on the line 4—4 of Figure 1 showing the parts on an enlarged sacle.

Figure 5 is an enlarged sectional view on the line 5—5 of Figure 3.

Figure 6 is a sectional view on the line 6—6 of Figure 1 showing the pawl release mechanism; and

Figure 7 is a similar view on the line 7—7 of Figure 1 showing additional features of the pawl mechanism.

On the accompanying drawings, I have used the reference numerals 10 and 12 to indicate front and rear wheels for supporting the jack structure. Side frames 14 connect with an axle 16 on which the wheels 10 are journalled. Side bars 18 are secured as at 20 to the side frames 14 and connect with a rear cross member 22 in the ends of which the rear wheels 12 are swivelly mounted.

The side frames 14 support a pivot shaft 24 on which is pivoted lifting arms 26. The arms 26 carry a pin 28 to which a lifting head 30 is pivoted.

The lifting head 30 has end arms 32 carrying pivots 34. Links 36 connect the pivots 34 with pivot bolts 38 on the side frames 14.

The links 36 serve to stabilize the head 30 or retain it level with respect to the jack frame in all positions of the head.

For imparting lifting movement to the lifting arm 26 and thereby raising the head 30 relative to the jack frame, I provide the following described mechanism. A pair of ratchet bars 40 have their rear ends connected with the cross member 22 and their forward ends connected with a cross member 42. A traveler 44 is adapted to travel along the ratchet bars 40. The traveler 44 consists of longitudinally arranged side plates, transverse pins 46, 46' and 46'' and rollers 48 and 50. The roller 48 is adapted to travel on a track bar 52 positioned between the ratchet bars 40. The rollers 50 are adapted to contact with the bottoms of the ratchet bars and the track bar.

The traveler 44 is connected by links 54 with the lifting arms 26. Pivots 56 and 58 serve as a means of connection between the lifting arms 26, the traveler 44 and the links 54. From the foregoing description, it will be seen that movement of the traveler 44 along the ratchet bars toward the front of the jack will impart raising movement to the lifting head 30. In order to operate the jack, it is necessary to impart such movement to the traveler. This is accomplished by the following described mechanism.

A yoke 60 is pivoted to the pin 56. The yoke 60 carries a notched sector 62. Pivoted on a pin 64 carried by the yoke, I provide an operating handle 66. The handle 66 may be adjusted relative to the yoke 60 and may be retained in any adjusted position relative thereto by a dog 68. The dog 68 is normally retained in engagement with one of

the notches of the sector 62 by a spring 70 and a link 72. The upper ends of the spring and link are connected with a release lever 74 which may be rotated clockwise (see Figure 3) to retract the dog 68 so that the operating handle 66 can be operated in a substantially vertical, horizontal, or one of two intermediate positions between vertical and horizontal.

Pivoted on the pin 64 carried by the yoke 60 is a pair of lifting pawls 76. It will be noted that the ratchet bars have teeth of substantially the same size which are staggered relative to each other. The pawls 76, however, are of equal length and by this arrangement, oscillation of the pawls even half a tooth will cause lifting action of the jack because when one pawl 76 does not catch, then the other one will.

It will now be obvious that the yoke 60 can be oscillated by oscillating the handle 66 and this will cause step by step movement of the traveler 44 in a left hand direction. To hold any lifting movement gained, I provide a hydraulic mechanism which I will now describe.

Pivoted on the cross member 42 is a hydraulic cylinder 78. A piston rod 80 is slidable relative thereto. The piston rod 80 carries a piston 82 within the cylinder 78. The piston rod 80 is pivoted to a pin 84 carried by the lifting arms 26.

Within the piston rod 80 (see Figure 4) I provide a check valve 86 held normally seated by a spring 88. During lifting movement of the jack, the piston will travel toward the left and oil from the left end of the cylinder 78 will pass through a port 90, a bore 92 and past the check valve 86 into the right end of the cylinder 78. The oil will be held by the check valve 86 so as to prevent any return movement of the traveler as caused by a load on the lifting head tending to lower the head.

To guard against any settling of the load and to eliminate the entire strain of holding the load being imposed on the hydraulic mechanism I provide settling pawls 94 pivoted on the pin 46. These are adapted to engage the teeth of the ratchet bars 40.

In order to lower the jack, it is necessary to disengage the pawls 76 and 94 and open the check valve 86. To accomplish this, I provide a release handle 98 connected by a cable 100 with an arm 102 of the pin 46 and with the check valve as will be described. The cable 100 extends under a pulley 104 mounted on a pin 106 carried by the handle 66.

The cable has a collar 108 adapted to engage an eye member 110 of the lever 102 through which the cable extends. When the handle 98 is pulled outwardly, the pin 46 will rock whereupon it will oscillate a pair of pins 112 extending therefrom. The pins 112 engage pins 114 extending from the settling pawls 94 for lifting them from the ratchet bars.

Lifting of the near side holding pawl will pull a rod 116 forwardly which will lift the near side lifting pawl 76. This pawl carries a pin 118 which engages a pin 120 extending from the pin 64. It will be obvious that lifting of the near side pawl 76 will therefore rotate the pin 64. The pin 64 carries a second pin 122 which engages a pin 124 extending from the far side lifting pawl 76. This will lift it from the ratchet bar so that all four of the pawls will then be lifted.

As soon as they are lifted, the check valve 86 will be opened by further outward swinging of the lever 98. This is accomplished through a bell crank lever 126 which is connected with the forward end of the cable 100 (see Figures 1 and 3) and which in turn is connected by a link 128 with a cam member 130. The cam member 130 is pivoted on the pin 84 and engages the forward end of a valve stem 132 (see Figure 4). It depresses the valve stem so that the valve 86 will be forced away from its seat against the action of the spring 88. The amount the valve is open, of course, will determine the speed of descent of the lifting head.

The pulley 104 is provided so that the lever 102 can be properly operated from the lever 98 regardless of the position of the operating handle 66 relative to the yoke 60. The bell crank lever 126 is provided so that the cam member 130 may be properly operated regardless of the position of the lifting head.

I have provided a jack structure in which by reason of staggering the ratchet bar teeth, only slight oscillations of the operating handle are necessary to impart lifting movement to the lifting head. It will be obvious, however, that the ratchet bar teeth could be made in alignment and the length of one lifting pawl made a half tooth different than the other one to secure the same results. The operating handle can be adjusted so that it can be in any desired position or any position required because of overhanging parts of the automobile. The slight oscillation necessary to operate the jack makes it especially desirable for flat balloon tires when bumpers, trunks, etc. overhang the axles of the automobile. The hydraulic mechanism provides an effective means for holding any lifting movement gained and also as a flexible control for the lowering movement of the jack. The speed of descent is entirely under the control of the operator and it is not necessary for him to work the handle of the jack to lower the lifting head as in most ratchet types of jacks.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In a jack structure, a horizontal frame, a lifting arm pivoted thereto, a lifting head carried by said lifting arm and means for imparting lifting movement to said lifting arm comprising a ratchet bar stationary on said frame and extending longitudinally thereof, a traveler movable longitudinally of said ratchet bar and operatively connected with said lifting arm and pawl means on said traveler to impart movement thereto.

2. In a jack structure, a horizontal frame, a lifting arm pivoted thereto, a lifting head carried by said lifting arm and means for imparting lifting movement to said lifting arm comprising a bar stationary on said frame and longitudinally arranged relative thereto, a traveler movable longitudinally of said bar, a link for operatively connecting said traveler with said lifting arm and means for moving said traveler relative to said bar.

3. In a jack structure, a horizontal frame, a lifting arm pivoted thereto, a lifting head carried by said lifting arm and means for imparting lifting movement to said lifting arm comprising a ratchet bar stationary on and longitudinal of said frame, a traveler movable longitudinally of said ratchet bar and operatively connected with said lifting arm, hydraulic mechanism for preventing lowering of said lifting head

and pawl means on said traveler to impart movement thereto in a direction for raising said lifting head.

4. In a jack structure, a horizontal frame, a lifting head raisable relative thereto and means for imparting raising movement to said lifting head comprising a ratchet bar lengthwise of and stationary on said frame, a traveler movable longitudinally thereof and operatively connected with said lifting head and pawl means for imparting movement to said traveler.

5. In a jack structure, a relatively long frame, a lifting head raisable relative thereto, means for imparting raising movement to said lifting head comprising a ratchet bar stationary on and lengthwise of said frame, a traveler movable longitudinally thereof and operatively connected with said lifting head and pawl means for imparting movement to said traveler in a direction to raise said lifting head and hydraulic mechanism to prevent return movement of said traveler.

6. In a jack structure, a relatively long frame, a lifting head raisable relative thereto, means for imparting raising movement to said lifting head comprising a ratchet bar stationary on and lengthwise of said frame, a traveler movable longitudinally thereof and operatively connected with said lifting head and pawl means for imparting movement to said traveler in a direction to raise said lifting head and hydraulic mechanism to prevent return movement of said traveler, said hydraulic mechanism including a check valve.

7. In a jack structure, a frame, a lifting head raisable relative thereto, means for imparting raising movement to said lifting head comprising a ratchet bar stationary on said frame, a traveler movable longitudinally thereof and operatively connected with said lifting head and pawl means for imparting movement to said traveler in a direction to raise said lifting head, hydraulic mechanism to prevent return movement of said traveler, said hydraulic mechanism including a check valve and common means for releasing said pawl means from said ratchet bar and opening said check valve to permit lowering of said lifting head.

8. In a jack structure, a horizontal frame, a lifting head raisable relative thereto and means for imparting raising movement to said lifting head comprising plural ratchet bar means stationary on and lengthwise of said frame, a traveler movable longitudinally of said ratchet bar means and operatively connected with said lifting head and plural pawl means coacting with said plural ratchet bar means for moving said traveler.

9. In a jack structure, a frame, a lifting head raisable relative thereto and means for imparting raising movement to said lifting head comprising plural ratchet bar means stationary on said frame, a traveler movable longitudinally of said ratchet bar means and operatively connected with said lifting head and plural pawl means coacting with said plural ratchet bar means for moving said traveler, said plural ratchet bar means having staggered teeth whereby movement of said pawl means less than a full tooth of any one of said ratchet bar means will cause step by step movement of said traveler along said ratchet bar means.

10. In a jack structure, a frame, a lifting head raisable relative thereto and means for imparting raising movement to said lifting head comprising a pair of ratchet bars having teeth in staggered relation to each other, said pair of ratchet bars being stationary relative to said frame, a traveler movable longitudinally of said bars and operatively connected with said lifting head and pawl means for imparting movement to said traveler.

11. In a jack structure, a horizontal frame, a lifting head raisable relative thereto and means for raising said lifting head comprising a horizontal, straight, stationary ratchet bar, a movable traveler, said traveler being operatively connected with said lifting head for raising it when said traveler moves in one direction relative to said ratchet bar and pawl means carried by said traveler to cause such movement thereof.

12. In a jack structure, a frame, a lifting head raisable relative thereto, means for raising said lifting head comprising a stationary ratchet bar, a movable traveler, said traveler being operatively connected with said lifting head for raising it when said traveler moves in one direction relative to said ratchet bar, pawl means carried by said traveler and directly coacting with said ratchet bar to cause such movement thereof and hydraulic mechanism to normally prevent reverse movement of said traveler.

13. In a jack structure, a frame, a lifting head raisable relative thereto, means for raising said lifting head comprising a stationary ratchet bar, a movable traveler, said traveler being operatively connected with said lifting head for raising it when said traveler moves in one direction relative to said ratchet bar and pawl means carried by said traveler and directly coacting with said ratchet bar to cause such movement thereof, hydraulic mechanism to normally prevent reverse movement of said traveler and valve means to permit such reverse movement.

14. In a jack structure a frame, a lifting head raisable relative thereto, means for raising said lifting head comprising a stationary ratchet bar a movable traveler, said traveler being operatively connected with said lifting head for raising it when said traveler moves in one direction relative to said ratchet bar and pawl means carried by said traveler and directly coacting with said ratchet bar to cause such movement thereof, hydraulic mechanism to normally prevent reverse movement of said traveler, valve means to permit such reverse movement and a single means for both releasing said pawl means and opening said valve means.

15. In a jack structure, a frame, a lifting head raisable relative thereto, means for raising said lifting head comprising a stationary ratchet bar, a movable traveler, said traveler being operatively connected with said lifting head for raising it when said traveler moves in one direction relative to said ratchet bar and pawl means carried by said traveler and directly coactable with said ratchet bar to cause such movement thereof, hydraulic mechanism to normally prevent reverse movement of said traveler and a pawl to prevent settling of said hydraulic mechanism and said lifting head.

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